NOVEMBER 1994 **HISTORICAL CLIMATOLOGY SERIES 4-7**
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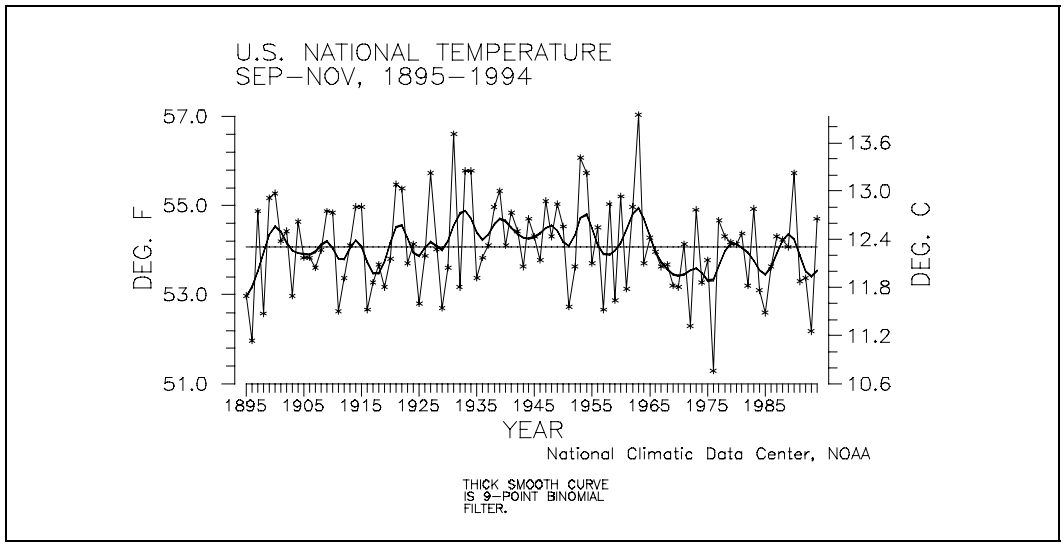
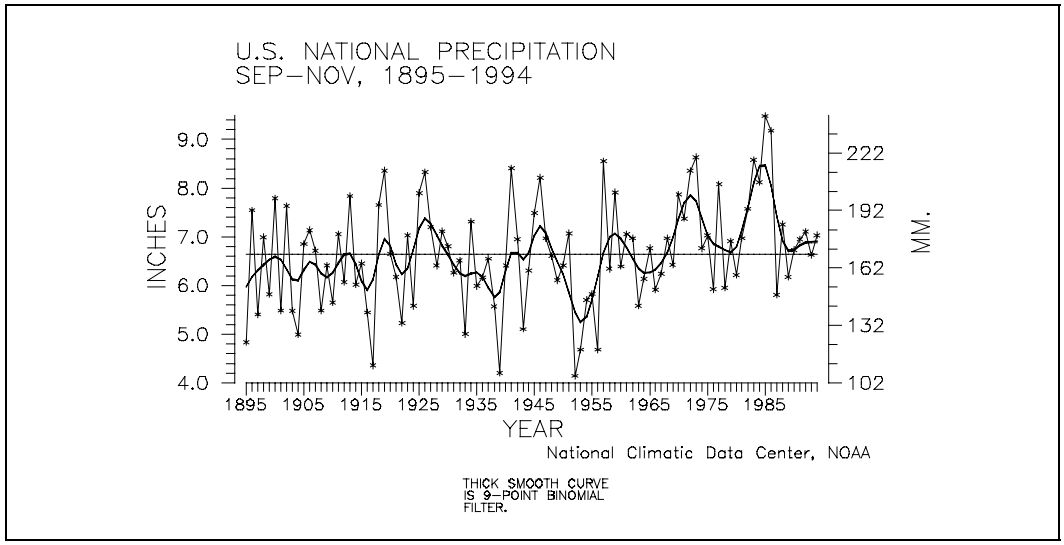
CLIMATE VARIATIONS BULLETIN





noaa NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION / NATIONAL ENVIRONMENTAL SATELLITE, DATA, AND INFORMATION SERVICE / NATIONAL CLIMATIC DATA CENTER ASHEVILLE, N.C.

This CLIMATE VARIATIONS BULLETIN (CVB) is a preliminary report that puts current monthly climate anomalies into historical perspective using climate databases archived at the National Climatic Data Center (NCDC). It is issued on a monthly basis. Supplemental sections are included which address seasonal and annual perspectives, when appropriate.

Current data are based on preliminary reports from First and Second Order airport stations obtained from the National Weather Service (NWS) Climate Analysis Center, and preliminary tornado statistics obtained from the NWS National Severe Storms Forecast Center. THE CURRENT DATA SHOULD BE USED WITH CAUTION. These preliminary data are useful for estimating how current anomalies compare to the historical record, however the actual values and rankings for the current year will change as the final data arrive at NCDC and are processed.

The following NCDC datasets are used for the historical data: the climate division drought database (TD-9640), the hurricane datasets (TD-9636 and TD-9697), the tornado dataset (STORM DATA), and the monthly station dataset (LCD supplemental files). It should be noted that the climate division drought database consists of monthly data for 344 climate divisions in the contiguous United States. These divisional values are calculated from the 6000+ station Cooperative Observer network.

The narrative, tables, and graphs in the CVB are also available via automated facsimile. The previous month's summary can be obtained after the tenth of the month by dialing 704-271-4570 and selecting the appropriate menu codes. A touch-tone fax machine is required.

If you have access to the Internet, copies of the CVB are available via both the NCDC's World Wide Web (WWW) server and the NCDC's anonymous FTP server.

NCDC's WWW server
URL for the CVB: http://www.ncdc.noaa.gov/publications/cvb/cvb.html

NCDC's anonymous FTP server
Machine: ftp.ncdc.noaa.gov
Directory: /pub/data/cvb

If you are a climate researcher and would like to order copies of the historical datasets used to make graphs of the type in this report, call 704-271-4994 or fax a letter to 704-271-4876 or mail a letter to the address given below, ATTN: Research User Services.

All other questions or requests for data should be made by calling 704-271-4800 or sending a fax to 704-271-4876 or by writing to:

National Climatic Data Center, NOAA
Federal Building
151 Patton Avenue, Room 120
Asheville, NC 28801-5001

If you use any of the information from this CVB, please identify "National Climatic Data Center, NOAA" as the source.

UNITED STATES NOVEMBER CLIMATE IN HISTORICAL PERSPECTIVE

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Preliminary data for November 1994 indicate that temperature averaged across the contiguous United States was above the long-term mean (see Figure 1). November 1994, with an averaged temperature of 43.3° (F), ranked as the 36th warmest November since national records began in 1895. This compares to the records of 46.1° (F) in November of 1909 and 1949 and 38.2° (F) in 1911. The normal averaged temperature for the contiguous United States for November is 42.38° (F). The 1994 value is based on preliminary data, which has been shown to be within 0.26°F (0.14° C) of the final data over a 46-month period. This confidence interval is indicated in the figure by '+'. The darker smooth curve is a nine-point binomial filter that averages out the year-to-year fluctuations and shows the longer-term variations. A full third (33.1%) of the country averaged much warmer than normal while 20.5% of the country averaged much cooler than normal for November 1994.

Areally-averaged precipitation for the nation was above the long-term mean, ranking November 1994 as the 31st wettest November on record. The preliminary value for precipitation is estimated to be accurate to within 0.14 inches (3.56 millimeters) and the confidence interval is plotted in Figure 2 as a '+'. Fourteen percent of the country experienced much wetter than normal conditions while 5.4% of the country was much drier than normal.

Historical precipitation is shown in a different way in Figure 3. The November precipitation for each climate division in the contiguous U.S. was first standardized using the gamma distribution over the 1931-90 period. These gamma-standardized values were then weighted by area and averaged to determine a national standardized precipitation value. These national weighted values were then normalized over their period of record. Negative values are drier and positive values are wetter than the mean. This index gives a more accurate indication of how precipitation across the country compares to the local normal (60-year average) climate. The national standardized precipitation ranked November 1994 as the 34th wettest such month on record.

In order to show more of a historical perspective, the precipitation and temperature rankings for the periods November 1994, October-November 1994, June-November 1994, and December 1993-November 1994 for the nine climatically homogeneous regions, as well as the national rankings, are listed in Table 1.

The regional rankings for temperature for the month of November indicate that warmer than normal conditions were noted for the eastern two thirds of the country (a line roughly from the high plains eastward) while the western third of the country was much cooler than normal. November 1994 was the fourth warmest such month since 1895 for the Northeast region (Figure 13) and the Central region, the fifth warmest for the Southeast, the ninth warmest for the East-North Central, and the 16th warmest for the South region. The West-North Central region was at the long-term mean with a ranking of 50th warmest. To the other extreme, it was the coolest November since 1895 for the West region (Figure 14), the seventh coolest for the Northwest, and the 15th coolest for the Southwest region. The average flow pattern for the month was a significant trough in the west and a notable ridge in the east. This allowed for the significantly cooler than normal conditions in the western portion of the country and at the same time allowed for warmer than normal conditions to dominate from the high plains eastward.

When the November rankings are compared to the October-November period, we see a striking similarity thanks to the above mentioned upper-level pattern dominating for the full two-month period. October-November 1994 was the sixth warmest such period for the East-North Central region and the ninth warmest such period for the Northeast and Central regions. Once again to the other extreme, October-November 1994 was the third coolest such two-month

period for the West region and the seventh coolest for the Northwest region. Evidence of the recently dominating pattern is lost when the six-month and twelve-month periods are examined. Every region of the country was within the warm half of the historical distribution for the six-month period and a total pattern reversal occurred for the twelve-month period, warmth in the west and cooler than normal conditions in the east.

Every region of the country except one (the Northwest, 33rd driest (Figure 12)) was within the wet half of the historical distribution for November 1994 with the Southwest region leader of the pack at 22nd wettest (Figure 11). Once again, credit goes the predominate flow pattern which allowed for a generous moisture tap from the Pacific to influence nearly all of the country.

Perhaps the most noteworthy change over time in rankings has occurred in the West region. After the 14th driest December-November period and the 36th driest June-November period, the region had improved rainfall deficits enough to record the 50th wettest October-November period and the 31st wettest November since 1895; a relatively wet start to their rainy season.

National averaged temperature for the year-to-date is shown in Figure 4. Temperature for the eleven-month period, January through November, was above the long-term mean ranking as the 21st warmest such period since 1895. Nearly one quarter of the country (22.8%) had much warmer than normal conditions for the January-November period while none of the country averaged much cooler than normal.

In Figure 5, national averaged precipitation for January-November is shown graphically. January-November 1994 was the 44th wettest such period since records began. Nearly ten percent (9.9%) of the country averaged much wetter than normal for the period while only 5.8% averaged much drier than normal. When the local normal climate is taken into account, January-November 1994 ranked as the 49th driest such period since 1895 (Figure 6).

Figure 7A shows, in illustrative map form, the November 1994 temperature rankings for the 48 contiguous states. Twenty-five states were within the top ten warm of the historical distribution for the month of November---all in the eastern half of the country. This included the second warmest November since 1895 for New Hampshire and the third warmest for Connecticut, Maryland, and Pennsylvania. Eleven other states were within the warm third of the historical distribution. Five states were within the top ten cool category of the historical distribution. It was the coolest November on record for California and Nevada, the second coolest for Utah, fourth coolest for Oregon, and the tenth coolest November since 1895 for Idaho. Four others were within the cool third of the historical distribution.

November 1994 state ranks for precipitation are shown in Figure 7B. It was the fifth wettest November on record for Missouri and Oklahoma, ninth wettest for Nevada and New Mexico, and the tenth wettest November on record for Florida. Fifteen other states were within the wet third of the historical distribution. No state was within the top ten dry for November and only seven were within the dry third of the distribution. It should be noted that the November state precipitation ranks are preliminary and should be used with considerable caution due to the high variability of precipitation on a small space and time scale.

Temperature and precipitation ranks for the eleven-month period, January-November 1994 are shown in map form in Figures 8A and 8B. Five states, all in the western quarter of the country, experienced their tenth warmest or warmer January through November period. Included in this statistic was the fourth warmest such period for Idaho, the sixth warmest for Utah and Washington, ninth warmest for Nevada, and the tenth warmest January through November period since 1895 for Arizona. Eight others were within the warm third of the historical distribution. No states were within the top ten cool ranking for the January-November period. Seven states however, were within the cool third of the historical distribution. Wyoming had the tenth driest January through November period while thirteen others were within the dry third of the distribution. It was the third wettest year-to-date for Georgia, sixth wettest for Florida, seventh wettest for Pennsylvania, and the eighth wettest January-November period for Tennessee and West Virginia. Fourteen other states were within the wet one third of the historical distribution for the January-November.

There was a slight increase in the national picture of severe to extreme long-term wet spell and a slight decrease in the percentage of the country experiencing severe to extreme long-term drought. Nationally, long-term drought conditions (as defined by the Palmer Drought Index) for November decreased to 10.8% of the country while the percent coverage of severe to extreme wet area increased to just under fifteen percent (Figure 9). Table 2 lists the precipitation ranks and statistics for selected river basins for the 1994-1995 Hydrologic Year thus far. The core wet areas

included portions of the northern Great Plains, the Southeast and the eastern Great Lakes. The core dry areas included much of the country from the Rocky Mountains to the Pacific coast as well as portions of the lower Great Lakes.

Table 3 shows extremes, 1961-90 normals, and the November 1994 values for both precipitation and temperature for the nine regions and the contiguous U.S.

Precipitation averaged across the Primary Hard Red Winter Wheat Belt ranked slightly above normal for the October-November growing season to date. (Figure 10).

According to preliminary data from the National Weather Service's National Severe Storms Forecast Center, there were 35 tornadoes across the contiguous United States in November 1994. The 1953-1993 average tornado count for November is 29. No tornadoes were reported in November 1976 while 149 were documented in November 1992. For the year-to-date, 1071 tornadoes have been documented compared with the 41-year average of 773. The year-to-date extremes are 400 in 1953 and 1282 in 1993. It should be noted that the preliminary tornado count is generally higher than the final count.

UNITED STATES AUTUMN CLIMATE IN HISTORICAL PERSPECTIVE

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Preliminary data for Autumn (September-November) 1994 indicate that temperature averaged across the contiguous United States was above the long-term mean. Autumn 1994 ranked as the 29th warmest autumn since national records began in 1895 (see Table 4) and marked a departure from the colder-than-normal autumns of the last three years (Figure 15). A tenth (10.1%) of the country averaged much warmer than normal while about one twentieth (4.5%) of the country averaged much colder than normal for Autumn 1994.

Areally-averaged September through November precipitation for the nation was above the long-term mean, ranking Autumn 1994 as the 33rd wettest Autumn on record (see Table 4 and Figure 16). The national standardized precipitation index (Figure 17) ranked 1994 as the 36th wettest autumn on record (page 1 explains how this index is computed). The standardized precipitation index (Figure 17) provides a climatological perspective of the season's anomalies, taking local normal climate into account so that regions with large precipitation amounts do not dominate the index value. Areally-averaged precipitation (Figure 16) provides a hydrological perspective. Nearly one twelfth (8.6%) of the country experienced much wetter than normal conditions while 3.1% of the country was much drier than normal.

The autumn temperature and precipitation ranks for 1994 for the nine climatically homogenous regions in the United States are listed in Table 4. Autumn temperatures averaged in the warm third of the historical distribution for the West North Central region and all regions east of the Mississippi River. For the East North Central region, 1994 had the fifth warmest autumn, breaking a string of much colder than normal autumns for the previous three years (Figure 18). Autumn 1994 was the warmest autumn since 1963 for the East North Central region. The South and Northwest regions had temperatures averaging in the middle third of the historical distribution, while the Southwest and West regions ranked in the cold third of the distribution. This pattern reflected the mean upper-level (jet stream) circulation, which consisted of a cold trough over the western U.S. and a warm ridge in the east. Autumn 1994, for the West region, ranked 15th coldest and marked a radical departure from the previous seven autumns (Figure 19).

The regional precipitation pattern for Autumn 1994 was consistent with a trough west-ridge east circulation pattern. The Southeast (Figure 20), South, and West North Central regions ranked in the wet third of the historical distribution, while most of the other regions were in the middle third (Table 4). The Northeast region had the 17th driest autumn in 1994, marking a departure from the previous nine years which had autumn precipitation near to above the long-term mean (see Figure 21).

On a statewide basis, nine states (FL, IA, MI, MN, NH, ND, OH, VT, and WI) ranked in the top ten warmest category for Autumn 1994 (see Figure 22A). Wisconsin had the third warmest autumn on record, and Minnesota ranked fourth warmest. Only one state (California) ranked in the top ten coldest category. Three states (FL, GA, and ND) ranked in the top ten wettest category, with North Dakota ranking as both third wettest and fourth warmest. Four states (NY, OH, VT, and WV) ranked in the top ten driest category (see Figure 22B).

According to preliminary data from the National Weather Service's National Severe Storms Forecast Center, there were 105 tornadoes across the contiguous United States during Autumn 1994. This compares to the 1953-1993 average of 93. It should be noted that the preliminary tornado count is generally higher than the final count and that the tornado observations have generally improved with time.

TABLE 1. PRECIPITATION AND TEMPERATURE RANKS, BASED ON THE PERIOD 1895-1994. 1 = DRIEST/COLDEST, 100 = WETTEST/WARMEST FOR NOVEMBER 1994, 100 = WETTEST/WARMEST FOR OCT-NOV 1994, 100 = WETTEST/WARMEST FOR JUN-NOV 1994, 99 = WETTEST/WARMEST FOR DEC 1993-NOV 1994.

REGION	NOV 1994	OCT-NOV 1994	JUN-NOV 1994	DEC 1993-NOV 1994
PRECIPITATION:				
NORTHEAST	57	13	52	80
EAST NORTH CENTRAL	76	62	83	53
CENTRAL	75	63	42	60
SOUTHEAST	68	87	100	89
WEST NORTH CENTRAL	55	96	63	27
SOUTH	58	83	60	51
SOUTHWEST	79	63	24	24
NORTHWEST	33	42	22	12
WEST	70	51	36	14
NATIONAL	70	83	65	43
TEMPERATURE:				
NORTHEAST	97	92	90	34
EAST NORTH CENTRAL	92	95	79	47
CENTRAL	97	92	71	42
SOUTHEAST	96	89	53	44
WEST NORTH CENTRAL	51	48	77	76
SOUTH	85	85	67	64
SOUTHWEST	15	14	86	94
NORTHWEST	7	7	76	92
WEST	1	3	70	84
NATIONAL	65	62	82	83

TABLE 2.
STATISTICS FOR SELECTED RIVER BASINS: PRECIPITATION RANKING FOR OCT-NOV 1994, WHERE RANK OF 1 = DRIEST, 100 = WETTEST, BASED ON THE PERIOD 1895 TO 1994, AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM (PALMER) DROUGHT, AND AREAL PERCENT OF THE BASIN EXPERIENCING SEVERE OR EXTREME LONG-TERM (PALMER) WET CONDITIONS, AS OF NOVEMBER 1994.
RIVER BASIN REGIONS AS DEFINED BY THE U.S. WATER RESOURCES COUNCIL.

RIVER BASIN	PRECIPITATION RANK	% AREA DRY	% AREA WET
MISSOURI BASIN	91	8.2%	15.7%
PACIFIC NORTHWEST BASIN	46	35.5%	.0%
CALIFORNIA RIVER BASIN	54	28.8%	.0%
GREAT BASIN	82	27.4%	.0%
UPPER COLORADO BASIN	40	44.7%	.0%
LOWER COLORADO BASIN	50	16.8%	.0%
RIO GRANDE BASIN	74	18.3%	3.9%
ARKANSAS-WHITE-RED BASIN	79	.0%	8.9%
TEXAS GULF COAST BASIN	97	.0%	54.9%
SOURIS-RED-RAINY BASIN	96	.0%	66.0%
UPPER MISSISSIPPI BASIN	75	.0%	13.3%
LOWER MISSISSIPPI BASIN	53	.0%	7.6%
GREAT LAKES BASIN	35	4.7%	25.7%
OHIO RIVER BASIN	33	.0%	7.4%
TENNESSEE RIVER BASIN	65	.0%	81.4%
NEW ENGLAND BASIN	7	4.5%	.0%
MID-ATLANTIC BASIN	26	.0%	11.2%
SOUTH ATLANTIC-GULF BASIN	89	2.6%	44.4%

TABLE 3. EXTREMES, 1961-90 NORMALS, AND 1994 VALUES FOR NOVEMBER

	PRECIPITATION (INCHES)					
	DRIEST		WETTEST		NORMAL	1994
REGION	VALUE	YEAR	VALUE	YEAR	PCPN	PCPN
NORTHEAST	.88	1917	6.34	1983	3.84	3.52
EAST NORTH CENTRAL	.20	1904	4.03	1931	1.89	2.25
CENTRAL	.71	1904	7.71	1985	3.53	3.96
SOUTHEAST	.83	1931	8.39	1948	3.30	3.27
WEST NORTH CENTRAL	.06	1939	1.63	1896	.74	.75
SOUTH	.20	1949	5.21	1940	2.63	2.56
SOUTHWEST	.06	1904	2.37	1905	.90	1.15
NORTHWEST	.30	1936	7.61	1909	3.78	2.98
WEST	.01	1929	5.56	1926	2.22	2.43
NATIONAL	.88	1917	3.76	1983	2.32	2.35

	TEMPERATURE (DEGREES F)					
	COLDEST		WARMEST		NORMAL	1994
REGION	VALUE	YEAR	VALUE	YEAR	TEMP	TEMP
NORTHEAST	32.3	1901	44.7	1931	38.7	43.1
EAST NORTH CENTRAL	24.9	1959	39.8	1899	33.1	37.4
CENTRAL	35.9	1976	51.4	1931	44.2	48.9
SOUTHEAST	48.2	1976	62.4	1985	55.0	59.1
WEST NORTH CENTRAL	17.3	1985	40.3	1949	30.9	31.0
SOUTH	45.5	1976	58.7	1909	52.5	55.2
SOUTHWEST	36.1	1972	46.9	1949	41.4	38.3
NORTHWEST	27.2	1985	42.8	1899	37.0	32.6
WEST	40.0	1994	51.8	1949	46.0	40.0
NATIONAL	38.2	1911	46.1	1909	42.7	43.3

TABLE 4. TEMPERATURE AND PRECIPITATION RANKINGS FOR SEP-NOV 1994, BASED ON THE PERIOD 1895-1994. 1 = DRIEST/COLDEST, 100 = WETTEST/HOTTEST.

REGION	PRECIPITATION	TEMPERATURE
NORTHEAST	17	83
EAST NORTH CENTRAL	66	96
CENTRAL	39	80
SOUTHEAST	84	73
WEST NORTH CENTRAL	80	78
SOUTH	74	65
SOUTHWEST	65	30
NORTHWEST	35	36
WEST	52	15
NATIONAL	68	72

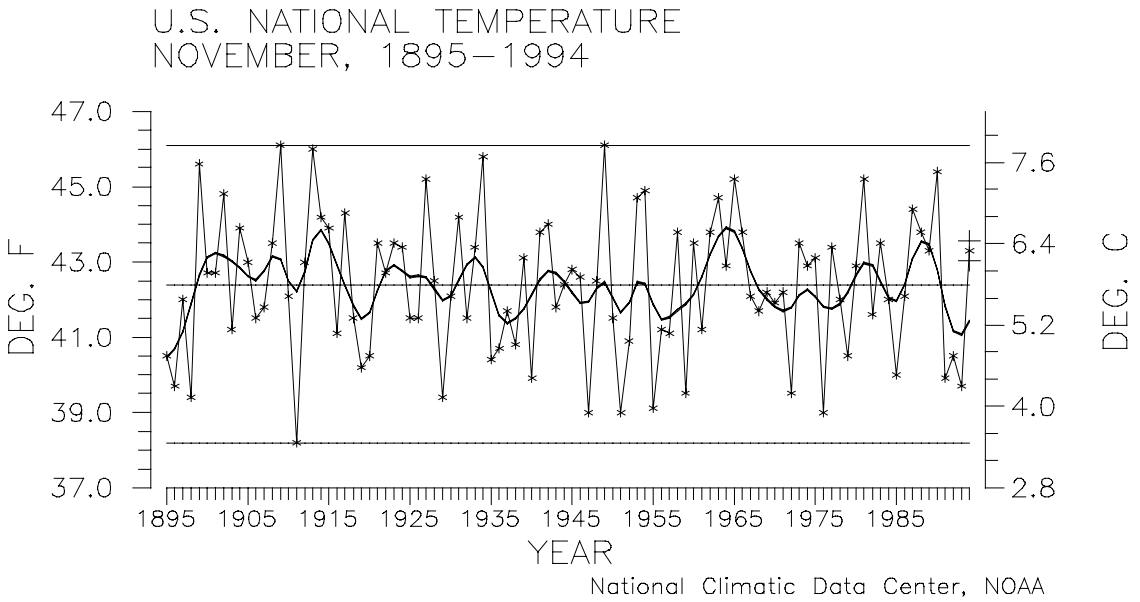

Figure 1

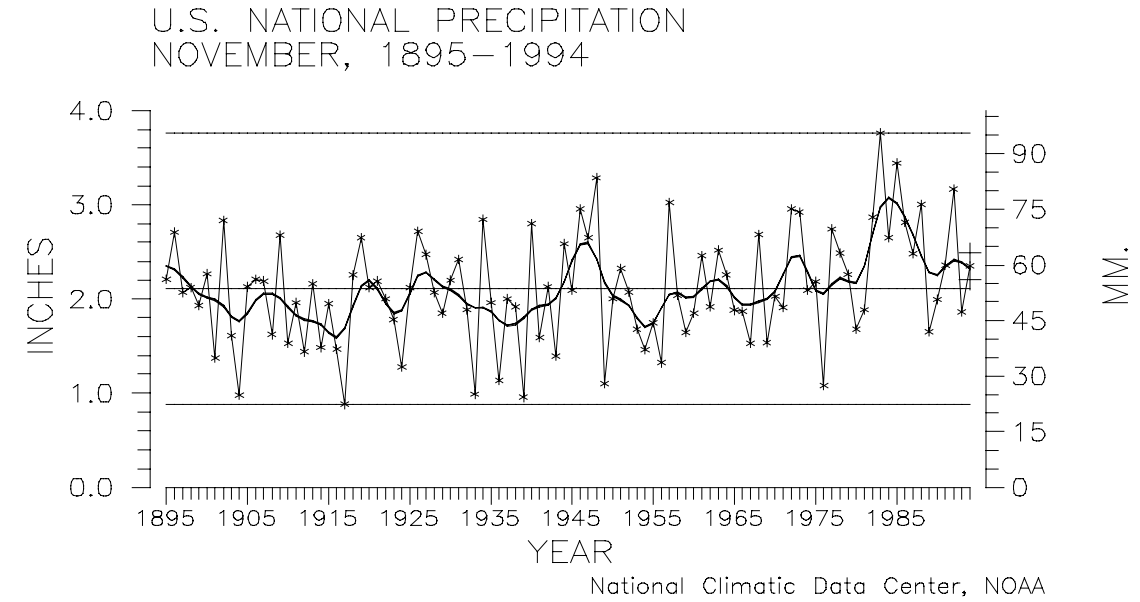

Figure 2

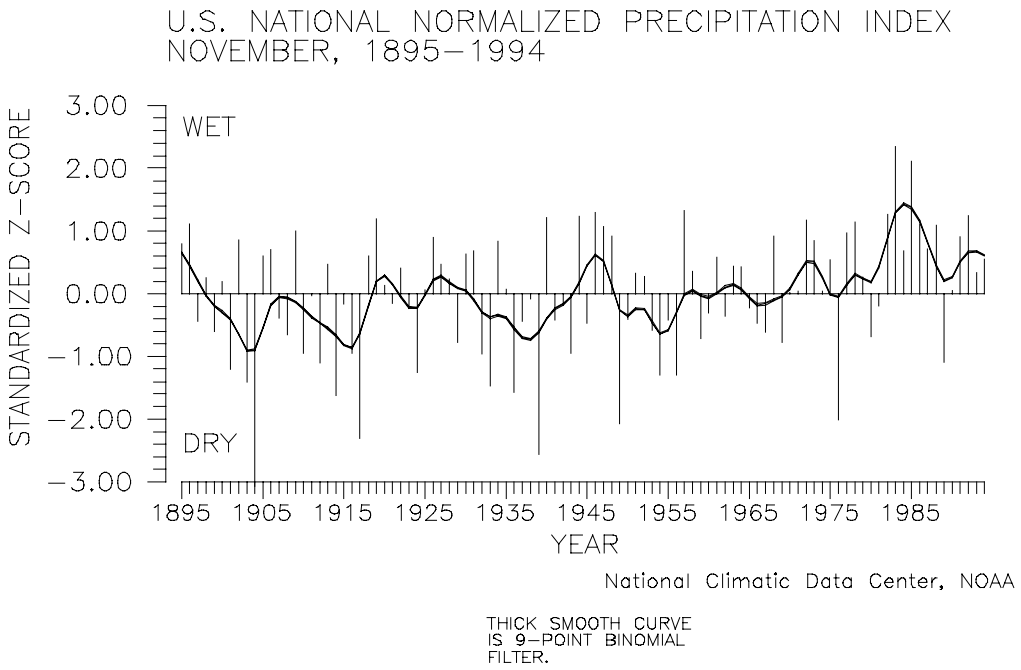

Figure 3

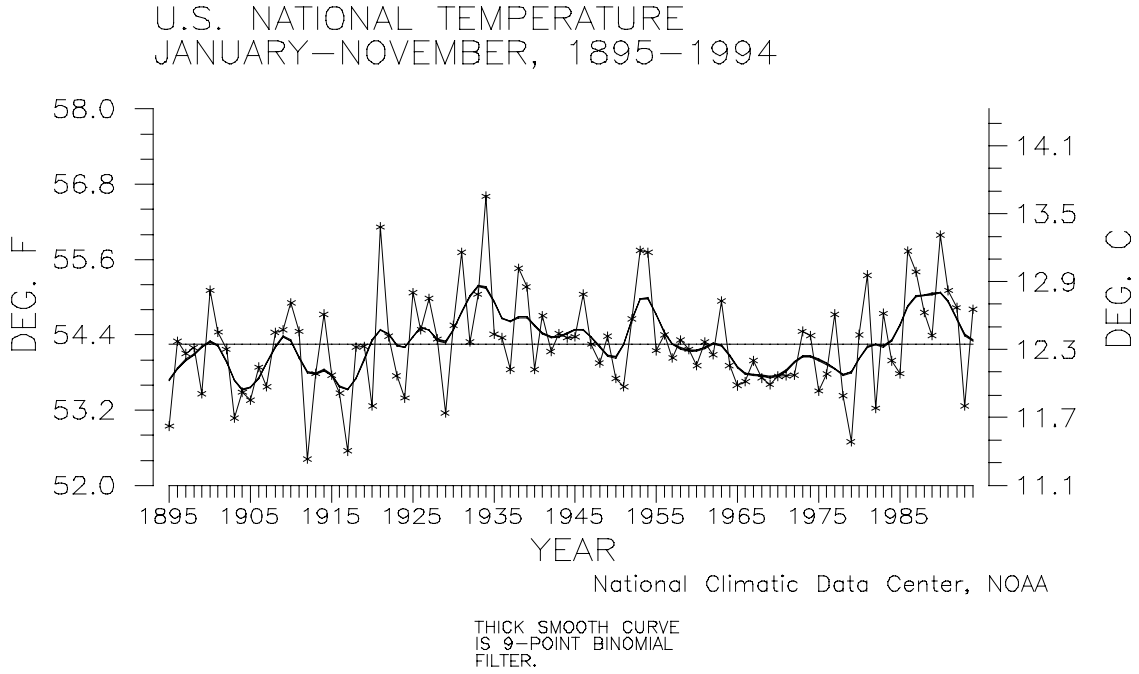

Figure 4

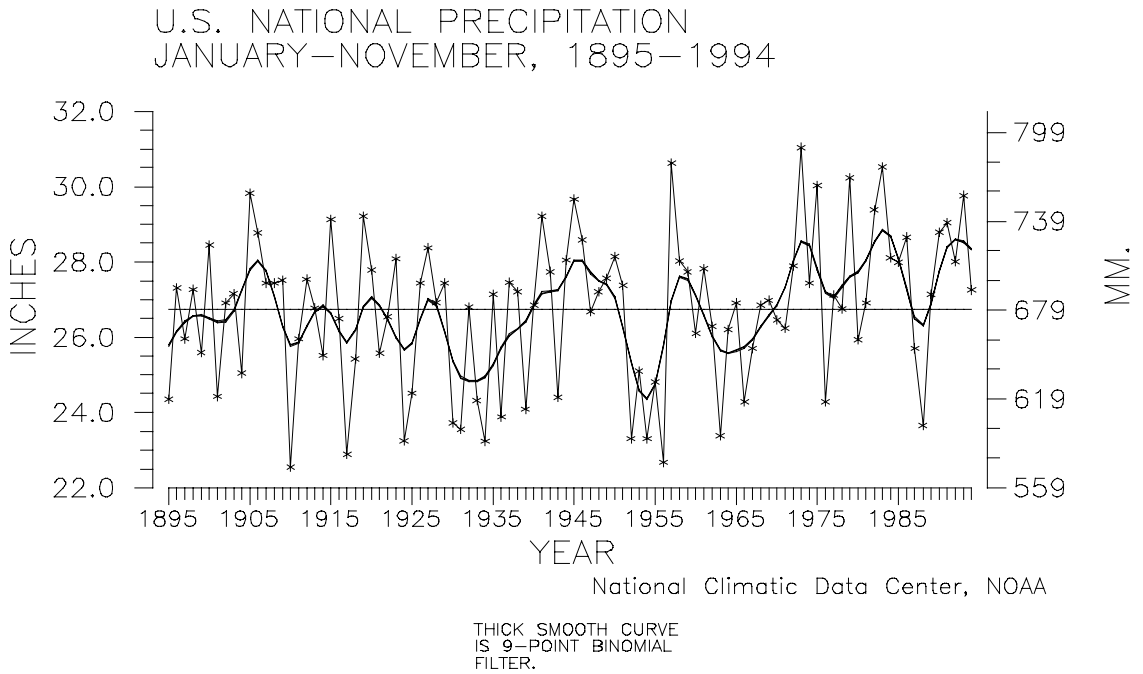

Figure 5

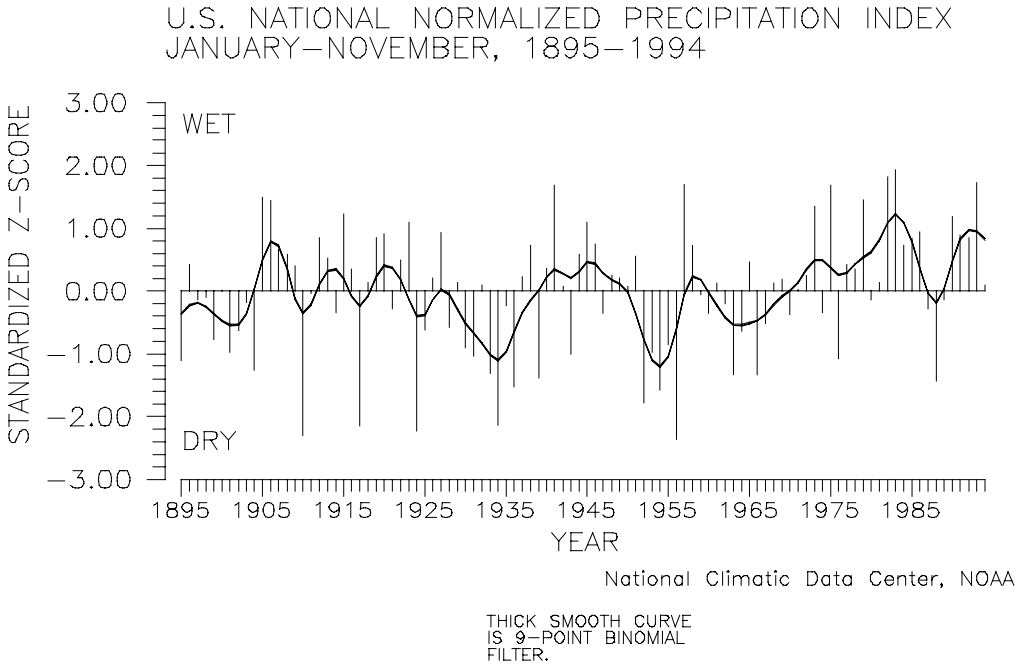

Figure 6

NOVEMBER 1994 STATEWIDE RANKS

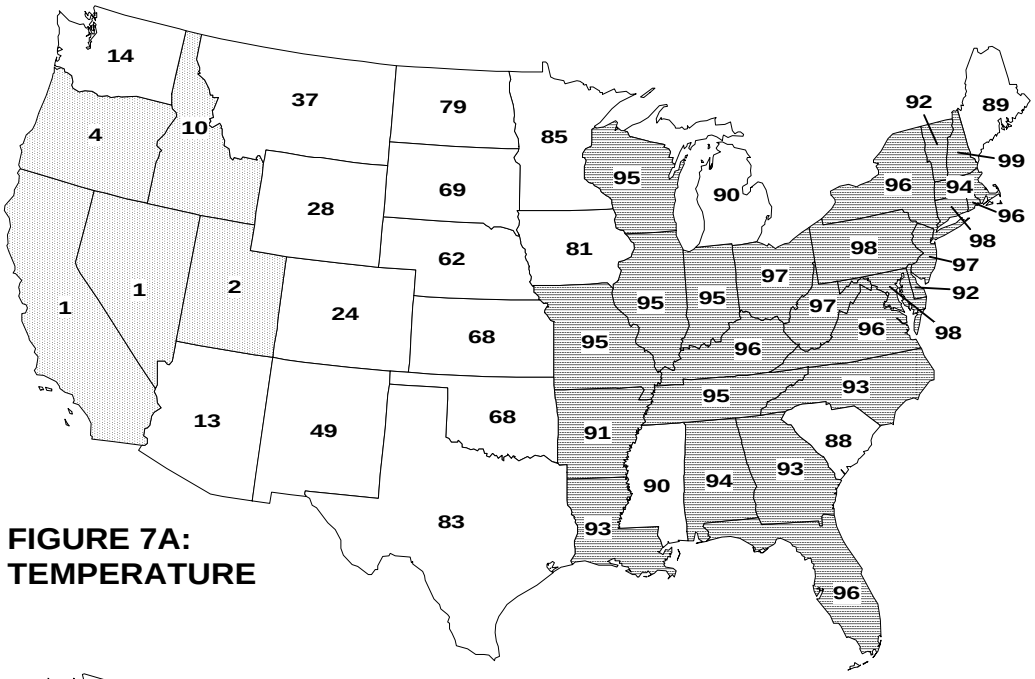

FIGURE 7A: TEMPERATURE

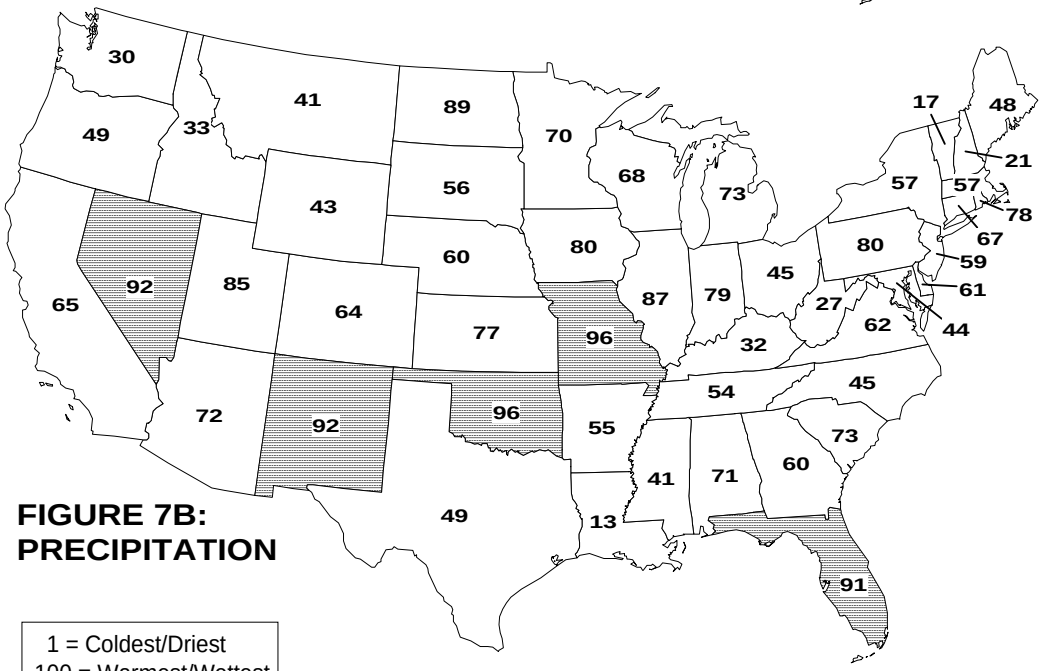

FIGURE 7B: PRECIPITATION

1 = Coldest/Driest
100 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1994. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 91-100) are shaded.

JAN-NOV 1994 STATEWIDE RANKS

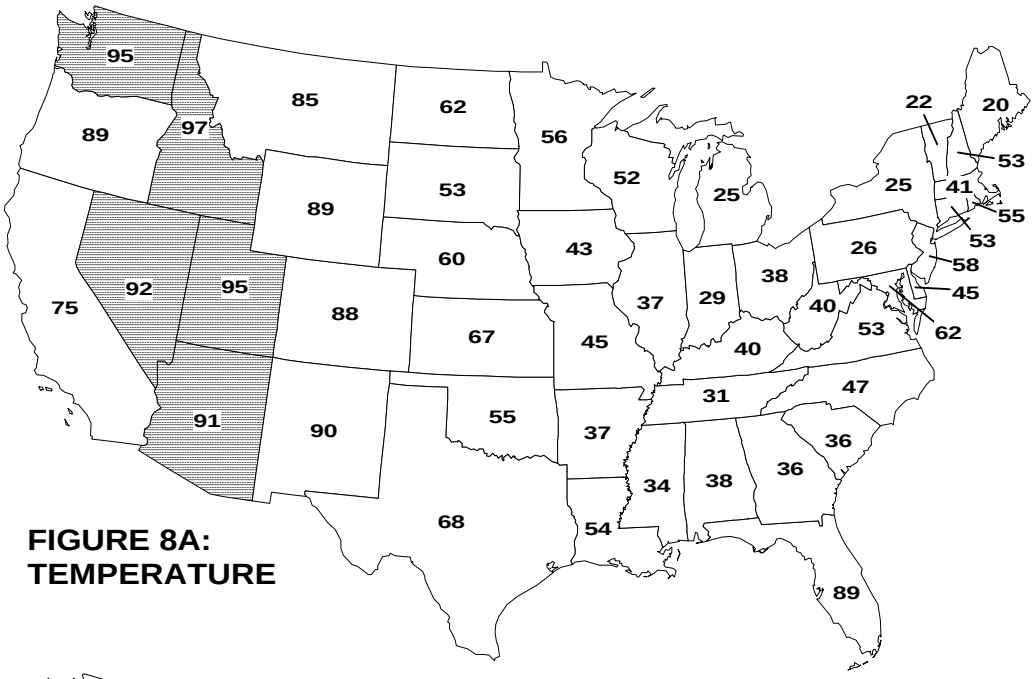

FIGURE 8A: TEMPERATURE

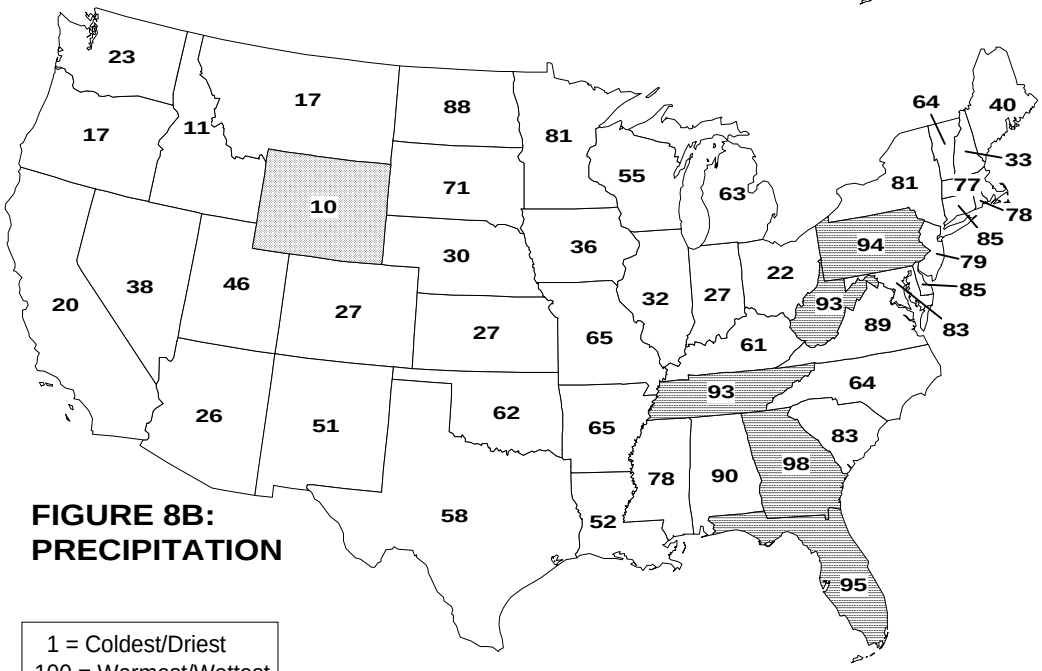

FIGURE 8B: PRECIPITATION

1 = Coldest/Driest
100 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1994. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 91-100) are shaded.

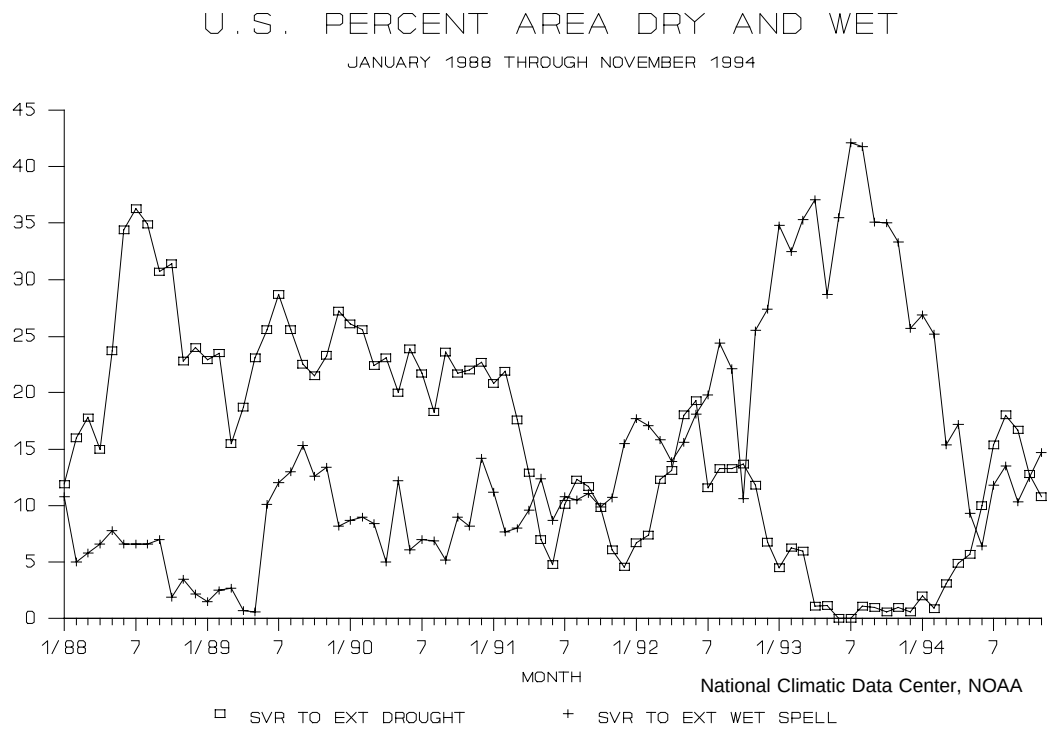

Figure 9

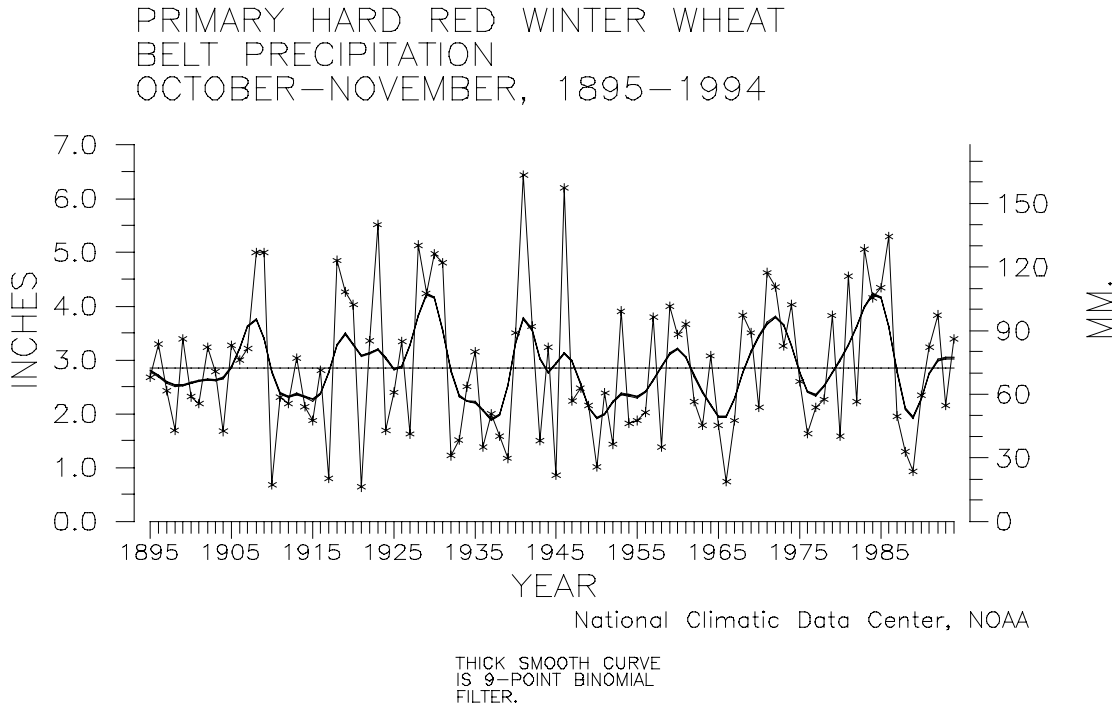

Figure 10

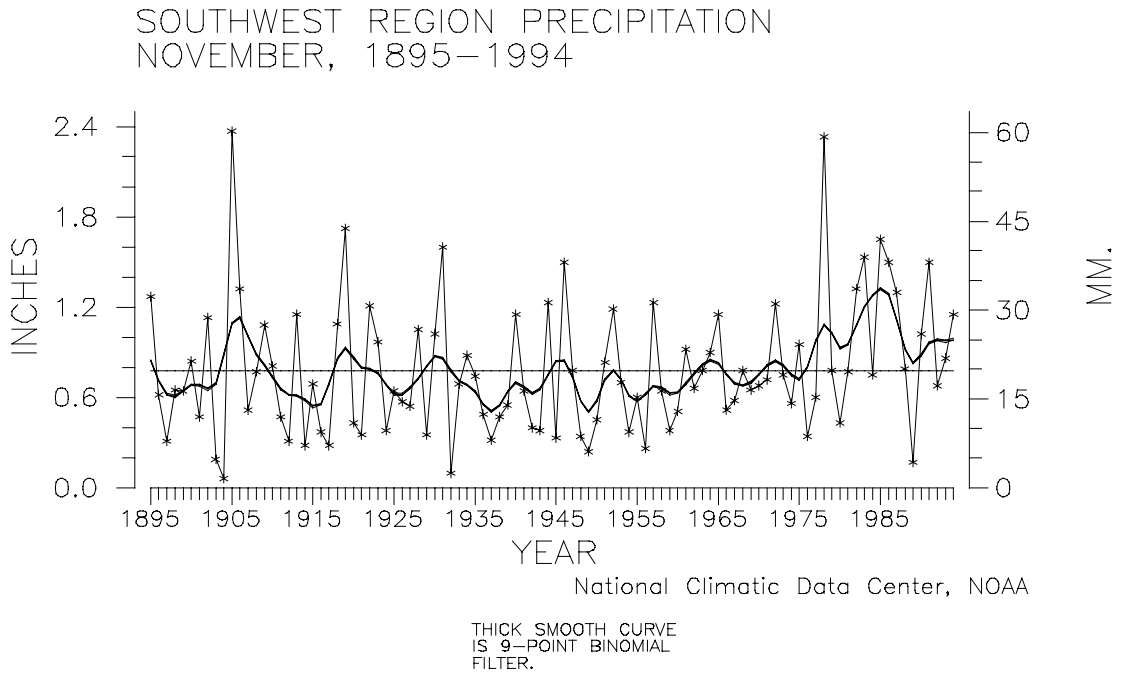

Figure 11

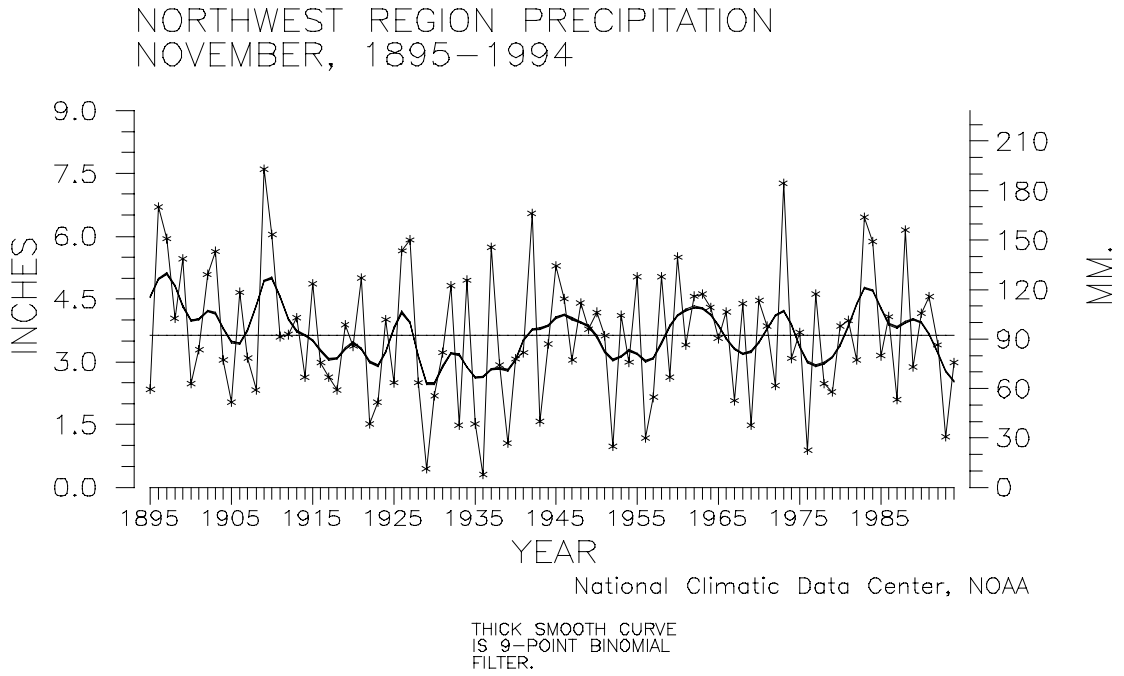

Figure 12

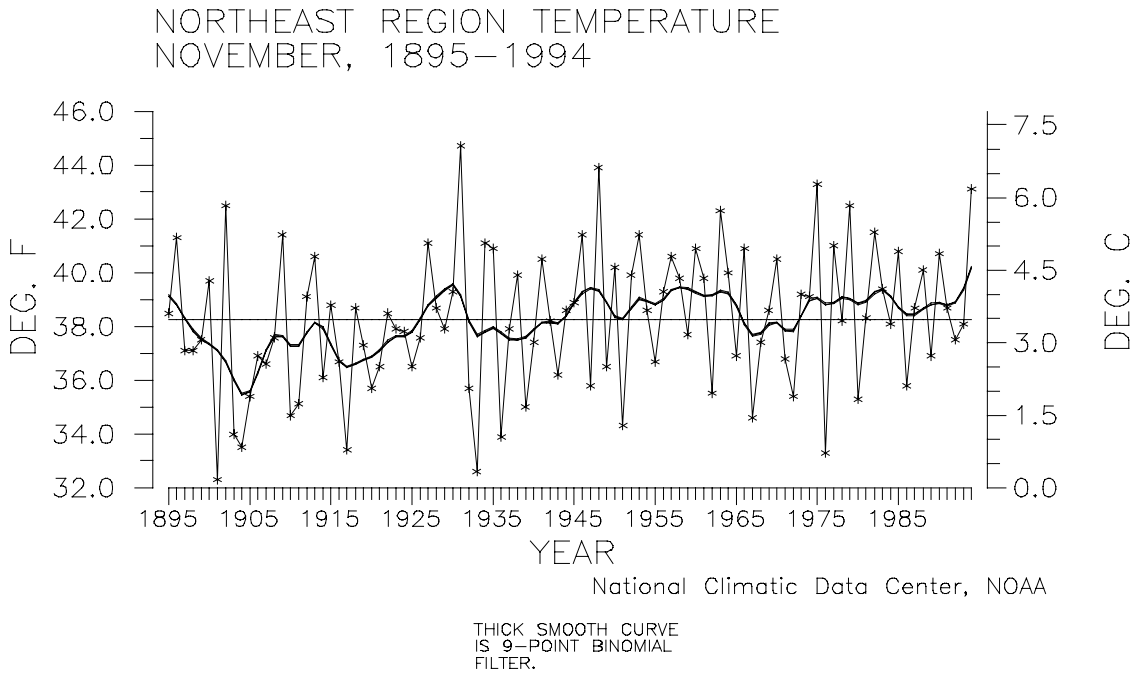

Figure 13

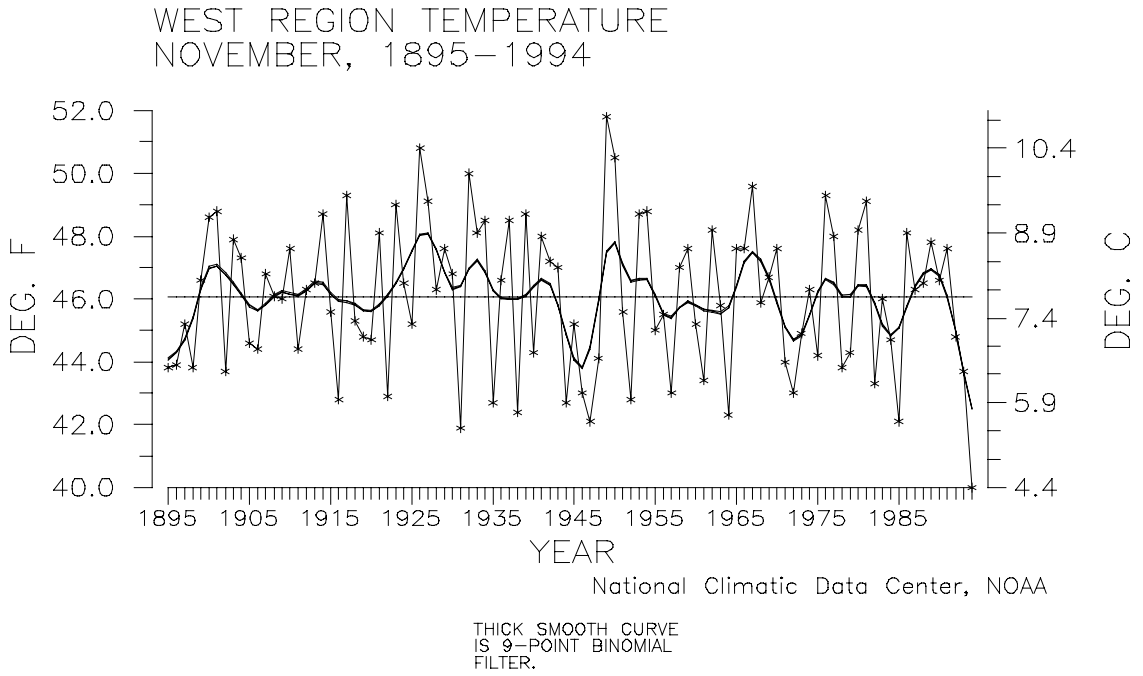

Figure 14

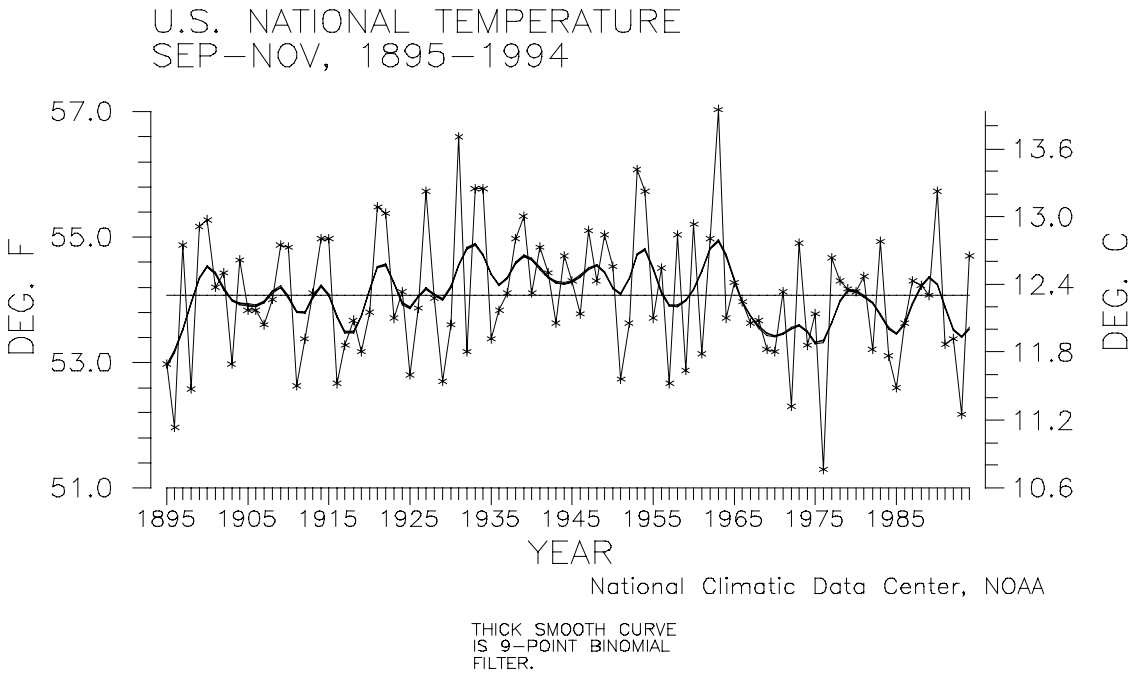

Figure 15

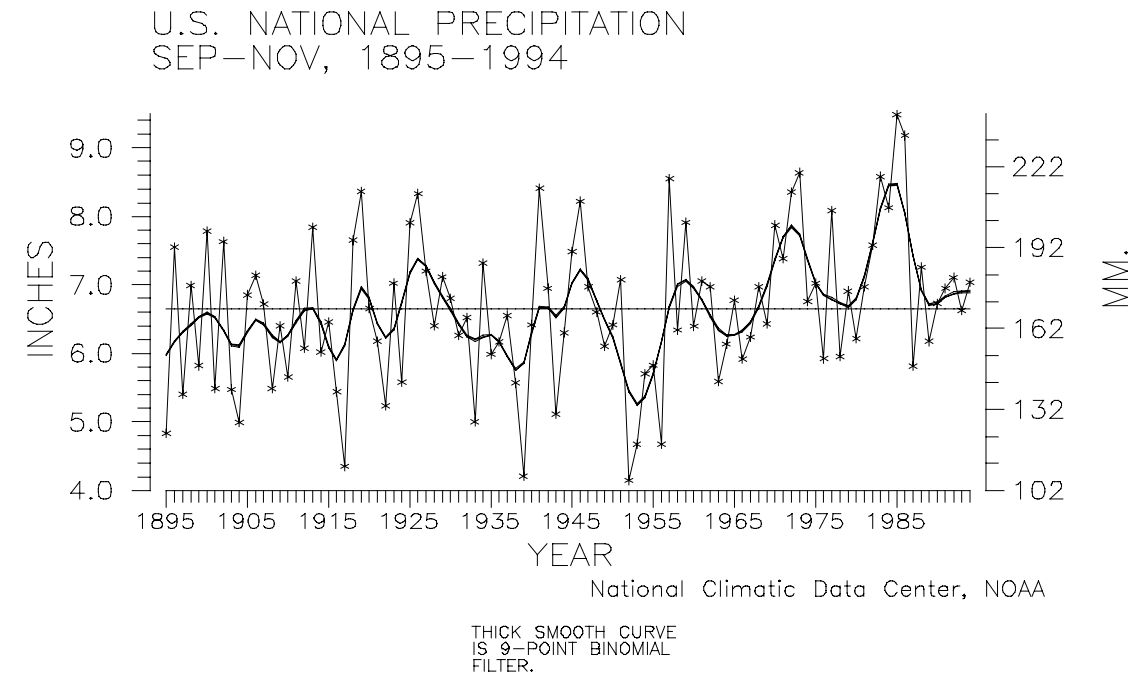

Figure 16

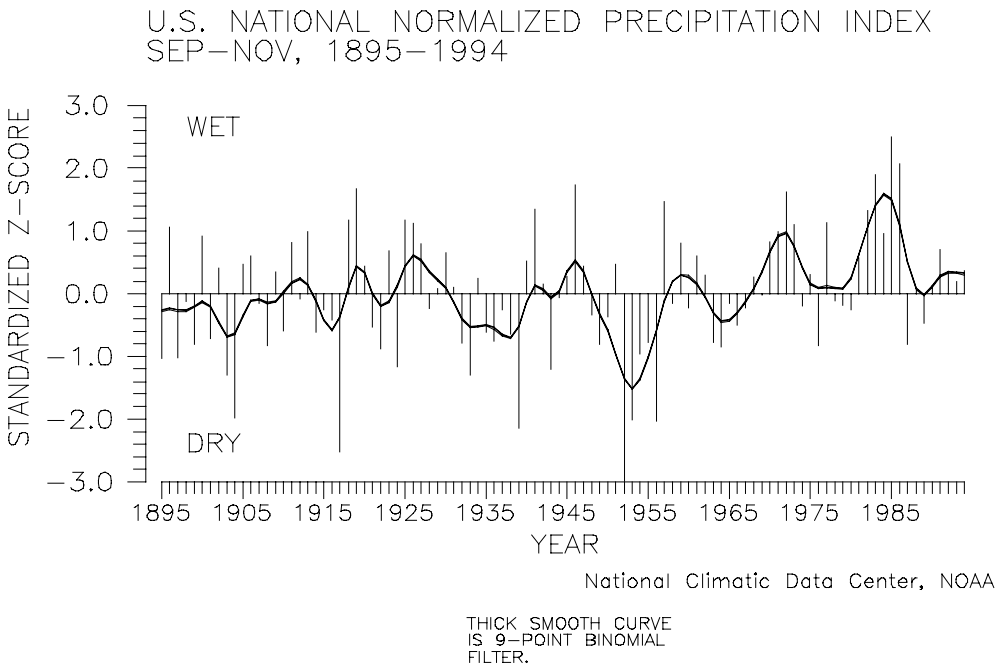

Figure 17

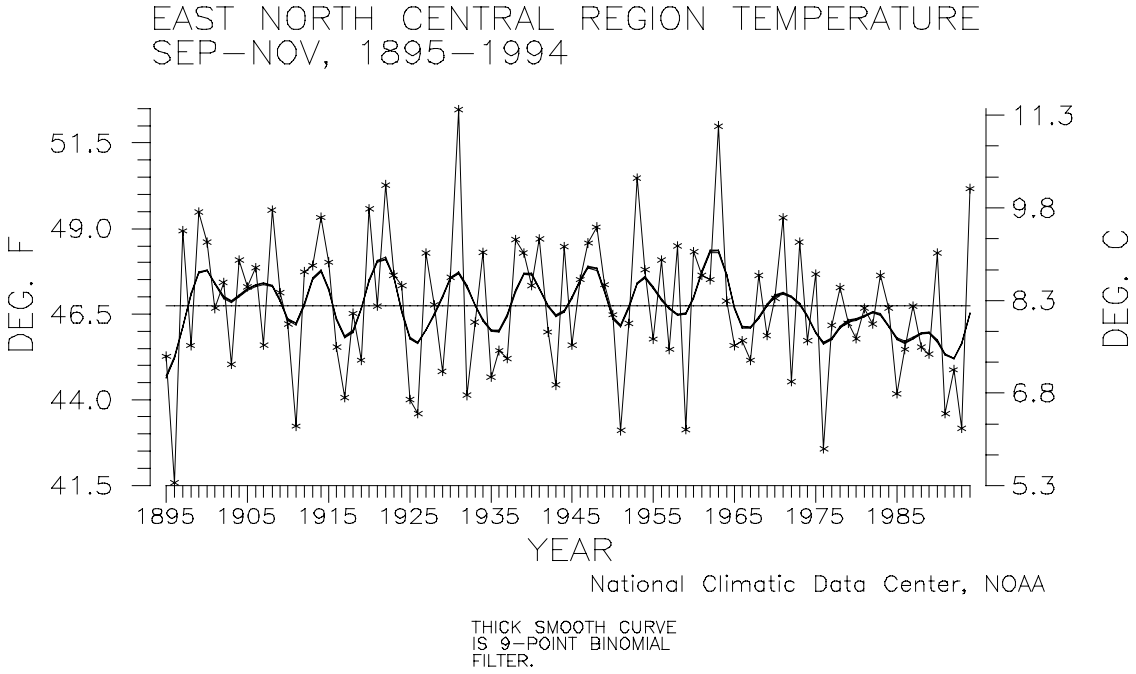

Figure 18

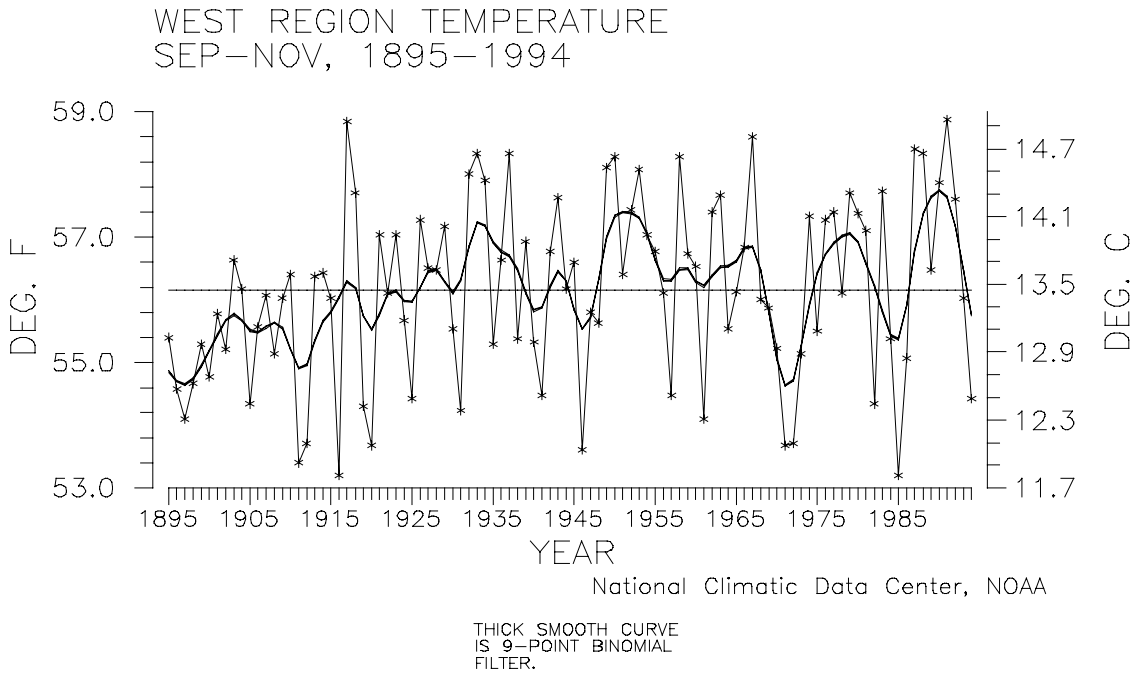

Figure 19

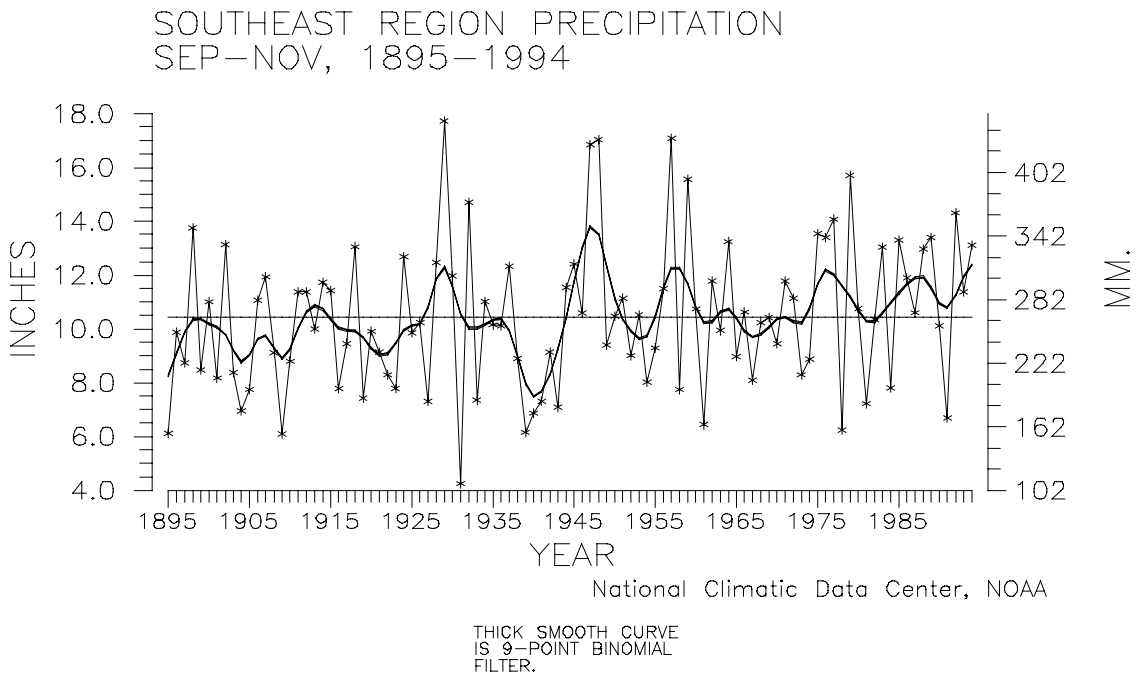

Figure 20

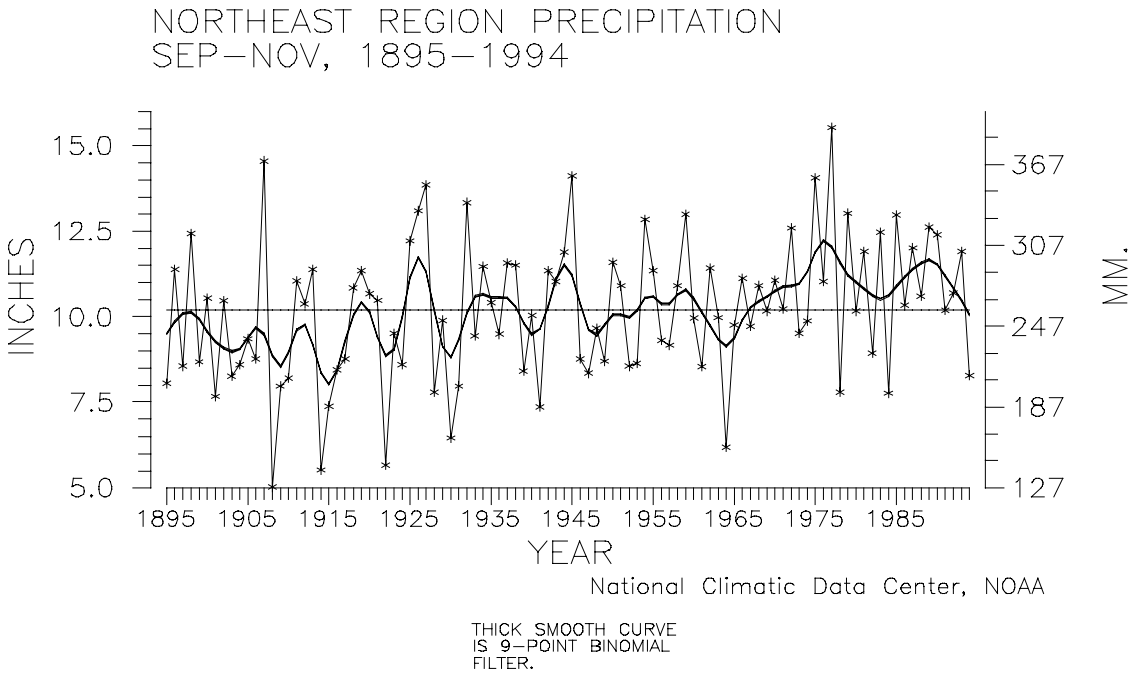
NORTHEAST REGION PRECIPITATION
SEP–NOV, 1895–1994
INCHES
15.0
12.5
10.0
7.5
5.0
MM.
367
307
247
187
127
1895 1905 1915 1925 1935 1945 1955 1965 1975 1985
YEAR
National Climatic Data Center, NOAA
THICK SMOOTH CURVE
IS 9–POINT BINOMIAL
FILTER.

Figure 21

SEP-NOV 1994 STATEWIDE RANKS

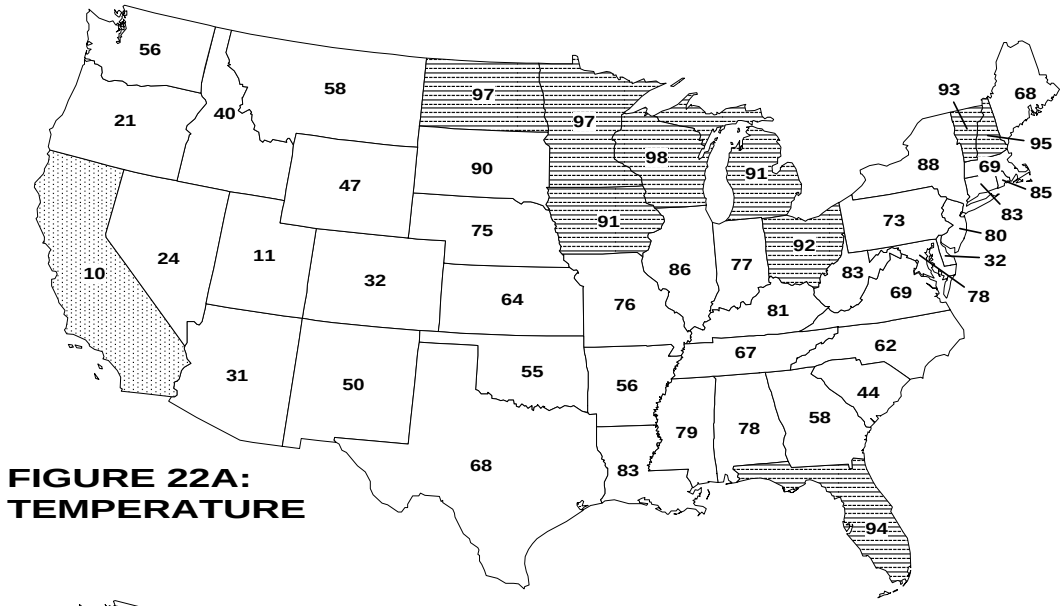

FIGURE 22A: TEMPERATURE

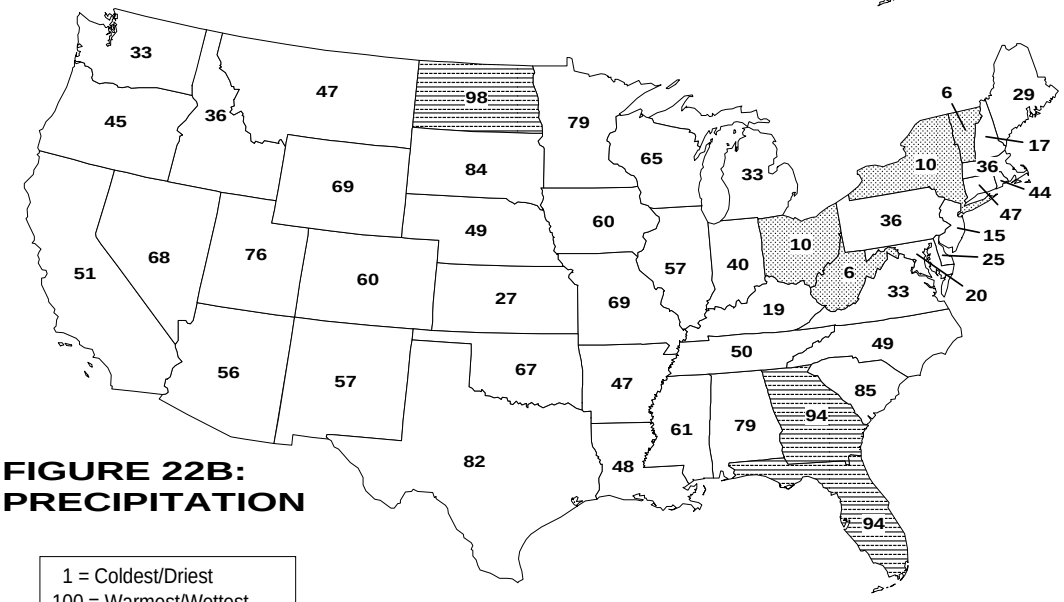

FIGURE 22B: PRECIPITATION

1 = Coldest/Driest
100 = Warmest/Wettest

National Climatic Data Center, NOAA

Temperature and Precipitation Ranks for the contiguous United States. Each state is ranked based on its data from 1895-1994. States having a rank of top ten coldest or driest (rank 1-10) or top ten warmest or wettest (rank 91-100) are shaded.